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## Regioselective and enantioselective photoredox catalysis within self-active coordination space of a homochiral Ru(II)-metalloligand-based Pd(II) nanocages

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Regio- and enantioselective photodimerization of naphthols and derivatives is attained within a chiral Ru(II)-metalloligand-based palladium(II) nanocage for the first time. The chiral octahedral Ru(II) catalytic centers on the  $\Delta\Delta\Delta\Delta\Delta\Delta\Delta\Delta$ -/ $\Lambda\Lambda\Lambda\Lambda\Lambda\Lambda\Lambda\Lambda$ -cage walls convert naphthol derivatives into the exclusive S-/R-naphthoquinone products with much higher chiral induction in comparison to the chiral RuL3 catalysts in bulk solution. The enhanced stereoselectivity is rationalized by the interplay of confined-space effect and aryl-aryl interactions between host and guest, which could stereo-control the transition state structures. The reaction mechanism has been investigated by Electron Spin Resonance (ESR) spectra, Cyclic Voltammetry (CV), UV/Vis absorption and fluorescence spectra. The results support the fact that the Ru(II) cage undergoes photoexcitation and subsequent oxidation by O<sub>2</sub> to give OH radicals and a Ru(III) intermediate cage. The Ru(III) intermediate is then capable of oxidizing naphthol substrate and removing an electron to provide the arene radical species, which is coupled with OH radical to give the naphthalene-1,2-dione intermediate, followed by rearomatization with the arene radical, and then form a C-C bond to obtain the naphthoquinone product without any significant observable byproduct. This dimerization reaction constitutes a very rare example of high asymmetric induction in oxidative biaryl coupling from a chiral photocatalyst, which closely resembles to biological systems.

### Biography

Cheng-Yong Su is a Professor of Chemistry at Sun Yat-Sen University. He obtained his PhD from Lanzhou University in the year 1996. He joined Prof. Wolfgang Kaim's group at Stuttgart University in the year 2001 as an Alexander von Humboldt Research Fellow, and continued his Post-doctoral work with Prof. Hans-Conrad zur Loye at the University of South Carolina in the year 2002. Then he was promoted to a Professor at Sun Yat-Sen University in the year 2004. He is the author of over 200 peer reviewed publications and 6 book chapters. His current research interest is in the field of supramolecular coordination chemistry and materials, focusing on metal-organic materials, catalysis and nanoscience relevant to clean environment and energy.

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